

REMARKS/ARGUMENTS

1. Claims

Claims 1, 3-11, 13, 15-21 and 23-28 are pending in the application. Favorable reconsideration of the application is respectfully requested in view of the following remarks.

2. Claim Rejections – 35 U.S.C. § 102(e)

Claims 1, 3-11, 13, 15-21, and 23-28 remain rejected under 35 U.S.C. 102(e) as being anticipated by Krishman, et al. (US 2005/0170783; newly cited art). Applicants respectfully traverse the rejection.

In the Final Office Action, the Examiner states:

Applicant's arguments filed 02/09/2009 have been fully considered but they are not persuasive. Applicant traverses to the rejections of claims 1, 3-11, 13, 15-21, and 23-28 by pointing out the differences (sections 1-3 as indicated on page 9 of 10 of the Amendment) between the cited reference Krishman et al (US 2005/0170783) and the disclosed embodiment. However, applicant's arguments fail to comply with 37 CFR 1.111 (b) because they amount to a general allegation that the disclosed embodiment define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the reference. Moreover, applicant's arguments do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the reference cited.

Applicant respectfully traverses this rejection. As noted below, notwithstanding the inadequacy of Examiner's last Office Action, Applicant's arguments complied with 37 CFR 1.111(c) as Applicant clearly pointed out the patentable novelty which the claims present in view of the state of the art disclosed by the cited reference.

Applicant reiterates, as was communicated in the last Response, that the Examiner has wholly failed to indicate how and where each of the elements of the present invention are disclosed by Krishman. Applicant stated in its last response:

According to the Examiner, Krishnan, as shown in figures 6 and 7, teaches a method and apparatus for estimating a channel response from pilot symbols (training symbols) comprising determining an initial channel estimate and the initial channel estimate is iteratively (repeatedly) processed by performing transformation to obtain the enhanced channel estimate. The enhanced channel estimate is later used for demodulating the received signal. The Examiner also refers to paragraphs [0014], [0029], [0040], [0041], [0054]-[0082], [0086] - [0114], [0137] - [0140], and [0145]. Although the Examiner did not map each of the elements of the present invention to Krishnan, Applicant nevertheless can distinguish Krishnan by showing that there are elements in the claims of disclosed embodiment of the present invention that are not found in Krishnan.

The Examiner's failure to map the elements of the cited reference to the claim elements of the present invention is not in compliance with the law, regulations and case law interpreting the foregoing. 35 U.S.C. 132 *Notice of rejection; reexamination* provides, in pertinent part:

(a) Whenever, on examination, any claim for a patent is rejected, or any objection or requirement made, the Director shall notify the applicant thereof, stating the reasons for such rejection...together with such information and references as may be useful in judging of the propriety of continuing the prosecution of his application...

Further, 37 C.F.R. 1.104 *Nature of examination*, provides in pertinent part:

(a) Examiner's action.

(1) On taking up an application for examination..., the examiner shall make a thorough study thereof and shall make a thorough investigation of the available prior art relating to the subject matter of the claimed invention. The examination shall be complete with respect both to compliance of the application...with the applicable statutes and rules and to the patentability of the invention as claimed...

(2) The applicant...will be notified of the examiner's action. The reasons for any adverse action... will be stated in an Office action and such information or references will be given as may be useful in aiding the applicant... to judge the propriety of continuing the prosecution.

(c) Rejection of claims.

(2) In rejecting claims for want of novelty..., the examiner must cite the best references at his or her command. When a reference is complex or shows or describes inventions other than that claimed by the applicant, the particular part relied on must be designated as nearly as practicable...

Further, in *Net Money In v. Verisign* (Fed. Cir. 2008) the Federal Circuit held that anticipation takes more than simply locating each element within the four corners of a single document. To anticipate, the prior art must teach all the claim elements and the claimed arrangement:

Section 102 embodies the concept of novelty—if a device or process has been previously invented (and disclosed to the public), then it is not new, and therefore the claimed invention is "anticipated" by the prior invention. . . . Because the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements "arranged as in the claim."

Hence, not only must the Examiner find and communicate to Applicant each claim element as found in the cited reference as correlated to the claims of the present invention, but must also find such elements as arranged in each claim. In other words, unless the Examiner first finds and communicates to Applicant each claimed element of the present invention as found in the cited reference, he would be unable to then show that such elements in the cited reference are as arranged in the claim. Because of the Examiner's failure to map the elements of the cited reference to the present invention, Applicant was left no option but to generally indicate how the present invention is distinguishable from Krishman.

Applicant's reply to the Non-Final Office Action complied with 37 C.F.R. 1.111, *Reply by applicant or patent owner to a non-final Office action* which provides, in pertinent part:

(b) In order to be entitled to reconsideration or further examination, the applicant or patent owner must reply to the Office action. The reply by

the applicant or patent owner must be reduced to a writing which distinctly and specifically points out the supposed errors in the examiner's action and must reply to every ground of objection and rejection in the prior Office action. The reply must present arguments pointing out the specific distinctions believed to render the claims, including any newly presented claims, patentable over any applied references. If the reply is with respect to an application, a request may be made that objections or requirements as to form not necessary to further consideration of the claims be held in abeyance until allowable subject matter is indicated. The applicant's or patent owner's reply must appear throughout to be a bona fide attempt to advance the application or the reexamination proceeding to final action. A general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references does not comply with the requirements of this section.

(c) In amending in reply to a rejection of claims in an application or patent under reexamination, the applicant or patent owner must clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. The applicant or patent owner must also show how the amendments avoid such references or objections.

Applicant thus illustrated (and restates below) that there are elements in the claims of disclosed embodiment of the present invention that are not found in Krishman. Unlike the disclosed embodiment of the present invention, Krishman is essentially performing interpolation in the frequency domain, a task well known in the art. Its use in OFDM systems is fairly straightforward. In Krishman, a set of initial channel estimates in the frequency domain is generated at those subcarriers (or frequencies) on which pilot signals are transmitted. Then, using the assumption that the time-domain response is "band-limited" in time by L taps, Krishnan performs interpolation of the initial channel estimate to all other targeted subcarriers through the use of the well-known, fixed FFT matrices or submatrices. Interpolation for low-pass signals, whether in time or in frequency, is well-known in the art of signal processing.

However, the use of interpolation in Krishman is very different from, as in the disclosed embodiment of the present invention, adding intentional-bias to channel estimates for at least the following reasons:

1. In Krishman, due to the method of interpolation, there are always two groups of frequencies or subbands. One set is where the samples are observed and pilot signals are transmitted, while the other set contains the frequencies where interpolated samples are generated. Depending on the pilot locations in frequency, there may not be any improvement in the initial channel estimate in the first set of subbands, as their “enhanced” channel estimate is just a result of interpolation among adjacent subbands or frequencies. In contrast, the disclosed embodiment of the present invention only requires one group of frequencies with which to work and the novel technique of adding intentional bias improves the time-domain channel estimate over the same set of frequencies.

2. The transformation used in Krishman is a fixed FFT matrix or its submatrix, as known to those skilled in the art of signal processing and does not depend on the initial channel estimate, the received signal, nor the pilot or training sequence. In contrast, in the disclosed embodiment of the present invention the transformation depends on both the pilot sequence and the initial channel estimate which in turns depends on the received signal.

3. Most importantly, Krishman fails to disclose or suggest the element of adding an intentional bias to improve the initial channel estimate. The estimate used in Krishman, namely the least-squares (LS) channel estimate, is well known in the art to be unbiased for *additive white Gaussian noise* (AWGN) (see paragraph [0049] of Krishman) under his assumption that the channel response has L taps. In fact, the LS channel estimate is known to be the *best linear unbiased estimate* (BLUE) estimate of the channel response under the influence of Gaussian noise.

Hence, Krishman fails to disclose at least the claimed elements (as found in independent claims 1, 11, 13, 21, 23 and 28) of:

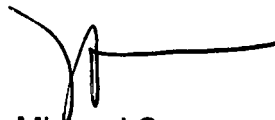
...applying bias to the initial channel estimate to obtain a biased channel estimate; and
using the biased channel estimate to demodulate a signal that is received over the channel.

CONCLUSION

In view of the foregoing remarks, the Applicants believe all of the claims currently pending in the Application to be in a condition for allowance. The Applicants, therefore, respectfully request that the Examiner withdraw all rejections and issue a Notice of Allowance for claims 1, 3-11, 13, 15-21, and 23-28.

The Applicants request a telephonic interview if the Examiner has any questions or requires any additional information that would further or expedite the prosecution of the Application.

Respectfully submitted,



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